

## 4275 Lesson Plan Outline Expectations (Number each item on your lesson plan!)

### Mystery Planet Detection

*Amount of time for this lesson = 45 minutes (Each Day Here)*

*Grade Levels: 4, 5*

1. Standards and Safety and Materials:
  - A. Standards - (Wyoming? NGSS? Number and write it out)
    - i. 3.3MD – Represent and Interpret Data
    - ii. 5.9S – Observe the properties of the planets in the Solar System
  - B. Safety Concerns:
    - i. Minimal safety concerns with regular class activity
  - C. Materials:
    - i. Solar System Powerpoint
    - ii. Mystery Planet Student Worksheet
    - iii. Pencil
2. Objectives: (List them and make sure all are measurable! **Bold the verbs.** Three different levels!)
  - A. SWBAT... **read** a bar graph and determine which planet each data bar represents
  - B. SWBAT... **explain** why they choose their mystery planet based on the numerical evidence provided
  - C. SWBAT... **describe** a planet based on numerical data
3. Connections, Misconceptions, and Crosscutting Concepts:
  - A. Real world connections: (List them - Like careers)
    - i. Reading, analyzing, and interpreting data from a table
    - ii. Reading, analyzing, and interpreting data from a graph
  - B. Student connections: (List them - What will they understand? Phone, tree, etc...)
    - i. Mystery/detective novels and movies
  - C. Misconceptions: (List those misconceptions related to your content)
    - i. The Sun is a planet
  - D. Crosscutting Concepts: (List them here – e.g. patterns, movement, function, etc...)
    - i. Patterns – students will recognize the patterns in the planet’s properties
    - ii. Scale, Proportion, and Quantity – students will understand the relative quantities of the planets
4. *Catch/Engagement:*

Tell students they are going to be a planet detective for the next hour. Show the Planet Properties table on the board and inform students that their job is to determine which planet in the Solar System our mystery planet is.
5. Pre-test:

Oral Pre-test questions. Have students “vote” on the answers and record them on the board or a piece of paper.

  - i. Do planets have the same properties?
  - ii. Can you tell multiple information about an object by looking at a data table?
  - iii. Can you tell multiple information about an object by looking at a plot?
6. Activity/*Exploration:* (**Bold the verbs that match the objectives.** ...Can have as many parts as needed.)

Include at least 1 science writing activity for the unit!

Part 1: Lecture (Can’t be more than 10-15 minutes!)

X – (Include all lecture notes, PowerPoint slides, etc... at end of this lesson)

  - i. Solar System Powerpoint

Y – (Step by step plan of delivery goes here... **Construct** a lesson as I lecture...)

  - i. Ask students what is in the Solar System. Write answer on board
  - ii. Tell students their objective of the lab
  - iii. Quickly go through Solar System Powerpoint, going over characteristics of planets
  - iv. Go through vocab list they will see on the worksheet

Part 2: Lab (Activities should take up 60% of the days – on average.)

M – (Include all worksheets, directions, etc... at end of this lesson)

  - i. Mystery Planet Student Worksheet

N – (Step by step directions go here... **Create** a lesson plan individually)

  - i. Handout the Mystery Planet Student Worksheet and quickly explain their mission
  - ii. Have students complete the worksheet
  - iii. As students work walk around and ask students which planet they think is the mystery planet and why they think that

- iv. When the class has completed the worksheet ask for volunteers to go their answers
- v. Tell students the mystery planet
- vi. Have students choose another planetary property and have them create a bar graph using the data for each planet in the Planetary Properties table.

Part 3: Reading (All readings should include before/during/after activities)

- i. Students will read and refer back to the mystery planet data table throughout the activity

Part 4: Discussion (Students will **list** and **describe** parts of a good lesson.)

- i. Students will describe why they choose the planet they did for their mystery planet
- ii. Students will describe why they labeled the bar chart the way they did

7. Review/Essential Questions/*Explanation*: (Should be very closely related to your pre/post tests! Explanation piece...)

A. Low Level – (Knowledge/Remembering and/or Comprehension/Understanding)

- i. Students will learn some basic properties of the planets in the Solar System
- ii. Students will understand that Jupiter is the most massive and largest planet in the Solar System

B. Middle Level – (Application/Applying and/or Analysis/Analyzing)

- i. Students will apply their knowledge of the planets to determine the mystery planet
- ii. Students will apply their knowledge of the planets to label a bar graph

C. High Level – (Synthesis/Evaluating and/or Evaluation/Creating)

- i. Students will create another plot using the planetary data table

8. Assessments (Post-test)/*Evaluation*: (**Bold the verbs that match the objectives and are in the activity.**)

A. Formative: (How will you check for learning/understanding in class?) – Oral questions

- i. Oral questions

B. Post-test: (Say, “Same as pre-test”; Compare w/pre-test to inform teaching!)

- i. Review Pre-test questions orally. If students are still not getting the correct answer go over that activity objective again.

C. Summative: (How will you check for final learning/understanding?) –

- i. Students will be able to explain why Jupiter is the mystery planet, referring back to the data table

D. Explain how the data will inform tomorrow’s teaching.

- i. No “tomorrow’s teaching” for outreach

9. Timeline:

A. Catch	2 min
B. Pre-test	3 min
C. Activity – 4 parts	30 min
i. Lecture	5 min
ii. Lab	15 min
iii. Reading	0 min
iv. Discussion	10 min
D. Review and Post-test	5 min (Put as many sections as you need)

10. Enrichment/*Elaboration*: (Include one enrichment activity for students that might finish early)

- A. Have students create another bar chart using a different planetary property

11. IEP Accommodations/Differentiation/Diversity: What accommodations will you use to support struggling learners?

When students are working on the activity I will walk around the classroom and ask if anyone has any questions or needs any extra help. If there are several students that need help I will pair them up with someone who is not struggling.

Sun  
Mercury  
Venus  
Earth  
Mars  
Asteroid Belt  
Jupiter  
Saturn  
Uranus  
Neptune  
Pluto/Kuiper Belt

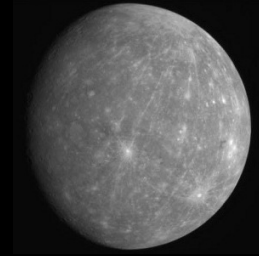
## Mercury

Terrestrial planet  
Closest planet to the Sun

Surface is heavily cratered

No atmosphere

Has 0 moons



## Venus

Terrestrial planet  
Thick atmosphere  
Atmosphere blocks surface from view  
Rotates in opposite direction  
Has 0 moons



## Earth

Terrestrial planet  
Home planet  
Only planet known to have life  
4 seasons due to its tilt  
Has 1 moon

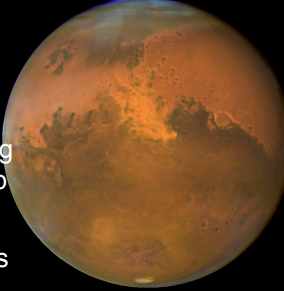


## Mars

Terrestrial planet  
The Red Planet

Surface has towering volcanoes and deep valleys

2 captured asteroids for moons



## Jupiter

Gas Giant  
Largest planet

Has rings

Big Red Spot-  
Storm that 2 Earths can fit in

Has 64 moons



## Saturn

Gas Giant

Most famous for its rings

Rings are made out of countless chunks of ice and rocks

Least dense object in the Solar System

## Uranus

Gas Giant

Blue in color

Lies on its side

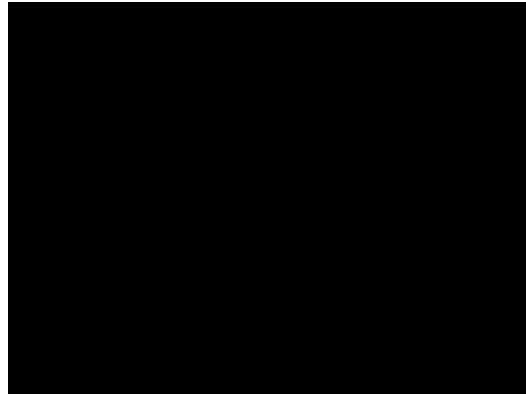
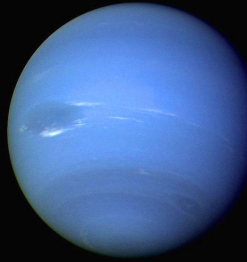
Has rings

Has 27 moons



# Neptune

- Gas Giant
- Near twin to Uranus
- Lies on its side
- Has rings
- Has 13 moons



# MYSTERY PLANET

Below are properties of 5 of the 8 planets in our Solar System. Your job is to determine which planet these properties describe.

Planet	Radius (km)	Mass (kg)	Density (g/cm <sup>3</sup> )	Orbital Period (Earth years)	Distance from the Sun (km)	Num of Moons	Rings
Mars	$3.39 \times 10^3$	$6.41 \times 10^{23}$	3.93	1.88	$2.28 \times 10^8$	2	No
Saturn	$5.82 \times 10^4$	$5.68 \times 10^{26}$	0.687	29.45	$1.43 \times 10^9$	62	Yes
Earth	$6.37 \times 10^3$	$5.97 \times 10^{24}$	5.51	1.00	$1.49 \times 10^8$	1	No
Neptune	$2.46 \times 10^4$	$1.02 \times 10^{26}$	1.64	164.79	$4.50 \times 10^9$	14	Yes
MYSTERY	$6.99 \times 10^4$	$1.90 \times 10^{27}$	1.33	11.86	$7.78 \times 10^8$	67	Yes

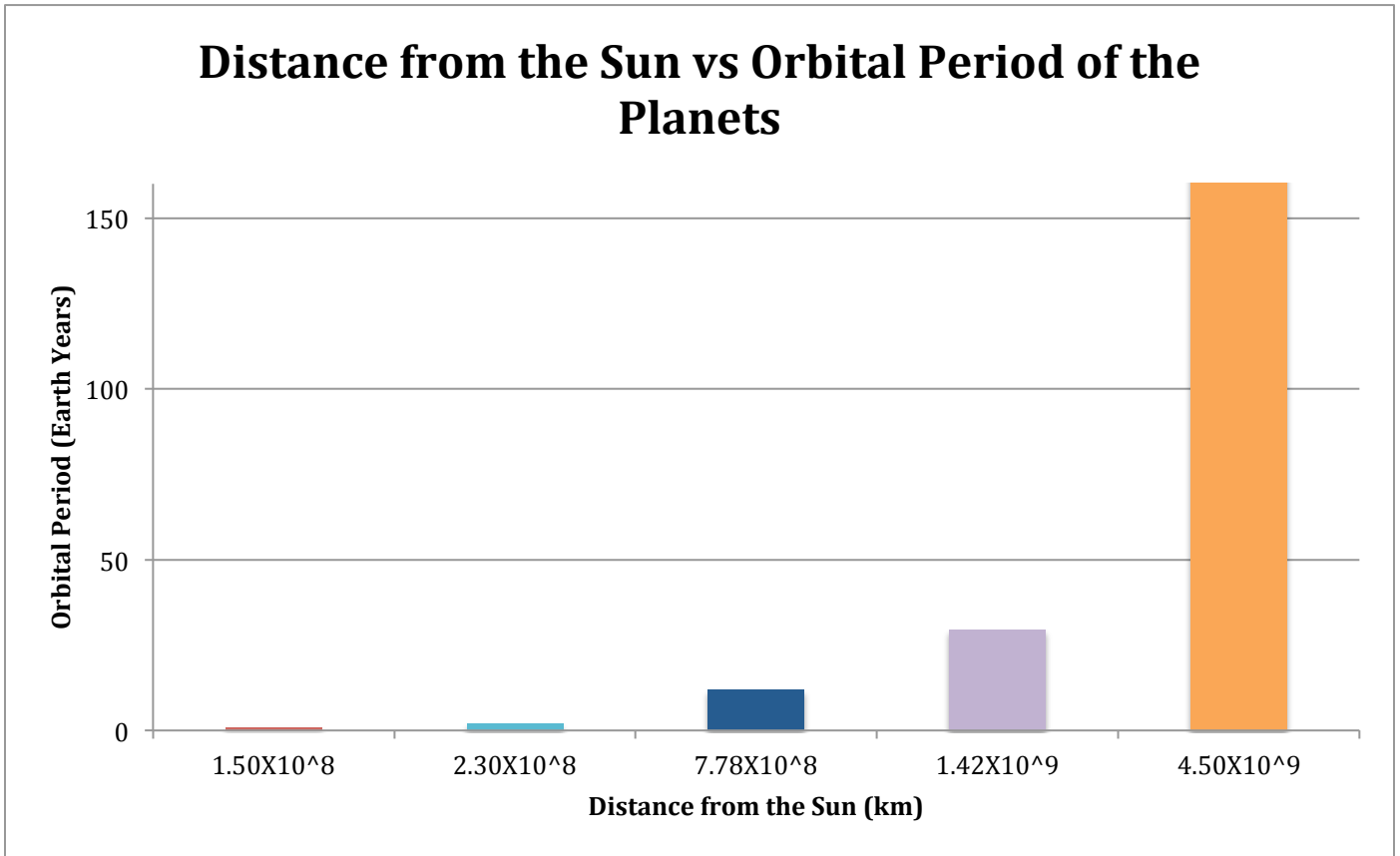
**PLANETARY PROPERTIES TABLE**

My mystery planet is:

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Explain why you think your mystery planet is that planet:

Below is a graph of distance from the Sun versus orbital period for the planets listed above. Determine which color line represents your mystery planet.



Below write the name of the planet next to the color line that represents the planet's orbital period and distance from the Sun in the graph above. The first one is done for you.



Earth



Using the Planetary Properties data table on page one create another bar graph using one of the properties. Provide a plot title, label the x and y axis, and label each planet.

